Big River LTX2
Real-time Disk System

Installation and User Manual

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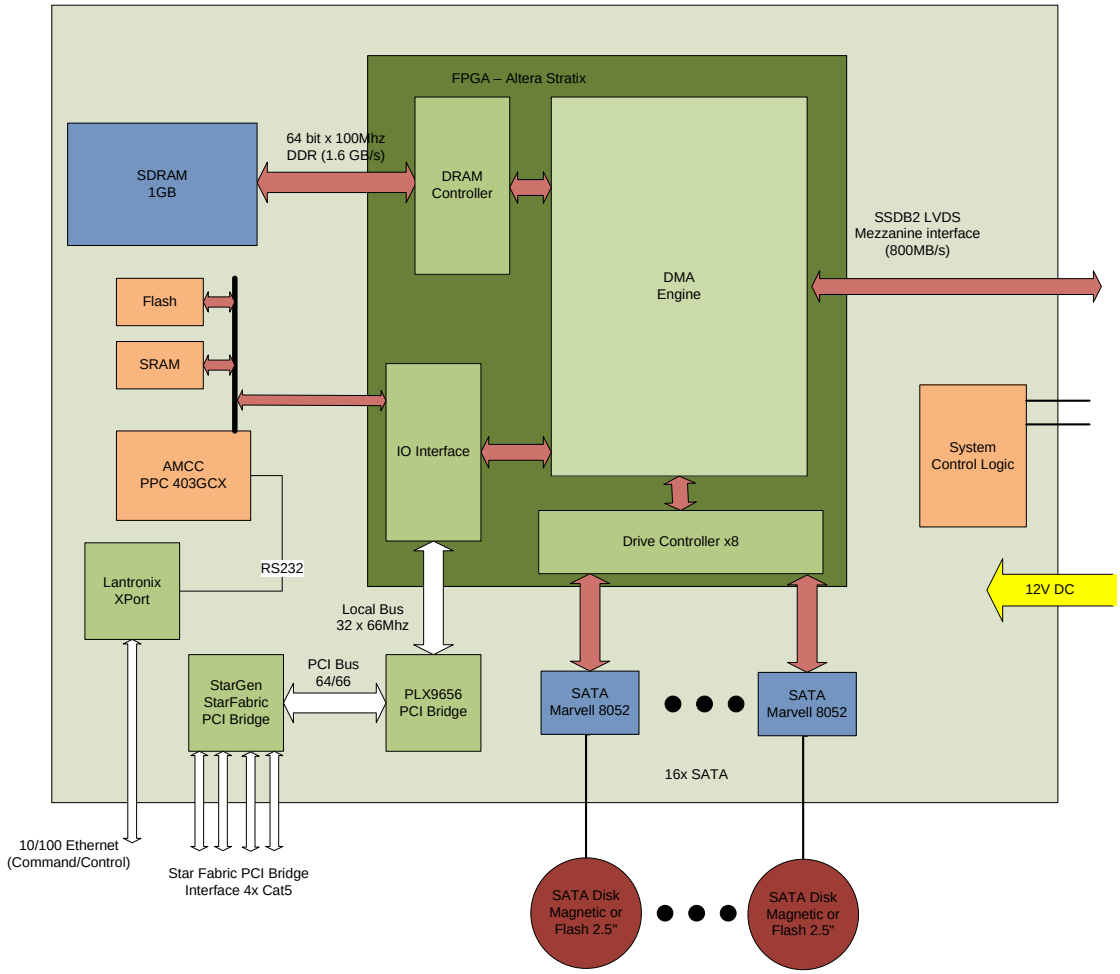

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About This Manual

This manual is intended to serve the following purposes:

* to provide an overview of the StreamStor LTX2 Real-Time Storage Controller

* to act as a guide for hardware installation

* to act as a reference for the operator

* to provide guidance on software capabilities and choices

It is suggested that you periodically check the Conduant web site for the most recent software updates, application notes, and technical bulletins.

If you are unable to locate the information you need, please feel free to contact us by e-mail or phone.

About the LTX2 Real-Time Storage System

Thank you for purchasing the Conduant LTX2 Real-Time Storage System. Your StreamStor based system is a disk-based, real-time recording system for external data sources which can operate standalone or connected to a host computer. The system consists of a 1U chassis housing a StreamStor Amazon controller and high performance disk drives. Included with your system are the device drivers, software development tools, and additional utility software required to adapt the system to your specific application. The LTX2 system will usually include an optional mezzanine board to provide external data interfaces for data recording and playback.

The PCI bus is a high performance I/O bus designed for attaching peripheral devices to computer systems. It is found in computing systems from many different manufacturers and is supported by most major operating systems. The LTX2 system includes a Star Fabric interface that provides a cabled bridge to the computer PCI bus. By utilizing the PCI bus instead of a proprietary bus interface, the LTX2 provides an open platform recording system accessible from software applications running Windows or Linux operating system on the host computer. The LTX2 provides a large capacity and cost effective alternative to system memory or other storage solutions for these applications.

The LTX2 System is able to receive data over the PCI bus directly from the data acquisition device at very high average (sustained) data rates. Virtually all of the available PCI cards that can record data to system memory are compatible with the LTX2. Only minor software modifications are generally required to redirect data to the LTX2 PCI (Star Fabric) interface. This capability is often in the software provided by the manufacturers of such data acquisition devices.

The StreamStor technology used in the LTX2 was specifically designed to record sequential data without interruption at very high data rates. This is in contrast to traditional storage systems that are designed for data processing purposes and cannot sustain these high data rates. Unlike typical computer disk storage solutions that are designed for optimum performance during random data reads and writes, StreamStor has been designed for optimum performance in sequential read and write operations. The StreamStor system has also been designed to operate without host computer intervention. This eliminates any bottlenecks or interruptions in the data stream due to heavy computer loads or delays.

The LTX2 system includes the capability of adding daughter (mezzanine) boards to provide different types of external interfaces such as the FPDP/FPDPII interface. Available interface include FPDP/FPDPII, Camera Link, LVDS (32 or 16 bit) and Serial FPDP (optical). These daughter boards move data to/from the LTX2 system at very high data rates with very little overhead. This provides a seamless method of interfacing to nearly any external data interface for high performance recording. Conduant can also develop custom daughter boards for unique or proprietary interface requirements.

The StreamStor SDK includes the device drivers and API (Application Programming Interface) to provide a smooth integration of the LTX2 with the data acquisition device and/or analysis software. Many examples are provided with the SDK and more are available upon request.

The LTX2 system is a flexible and powerful platform for high performance recording applications. The system also has the capability to provide a web based interface to allow command/control from nearly any networked computer. Many custom and unique capabilities are available that are beyond the scope of this documentation so please contact Conduant with your questions and special requirements.

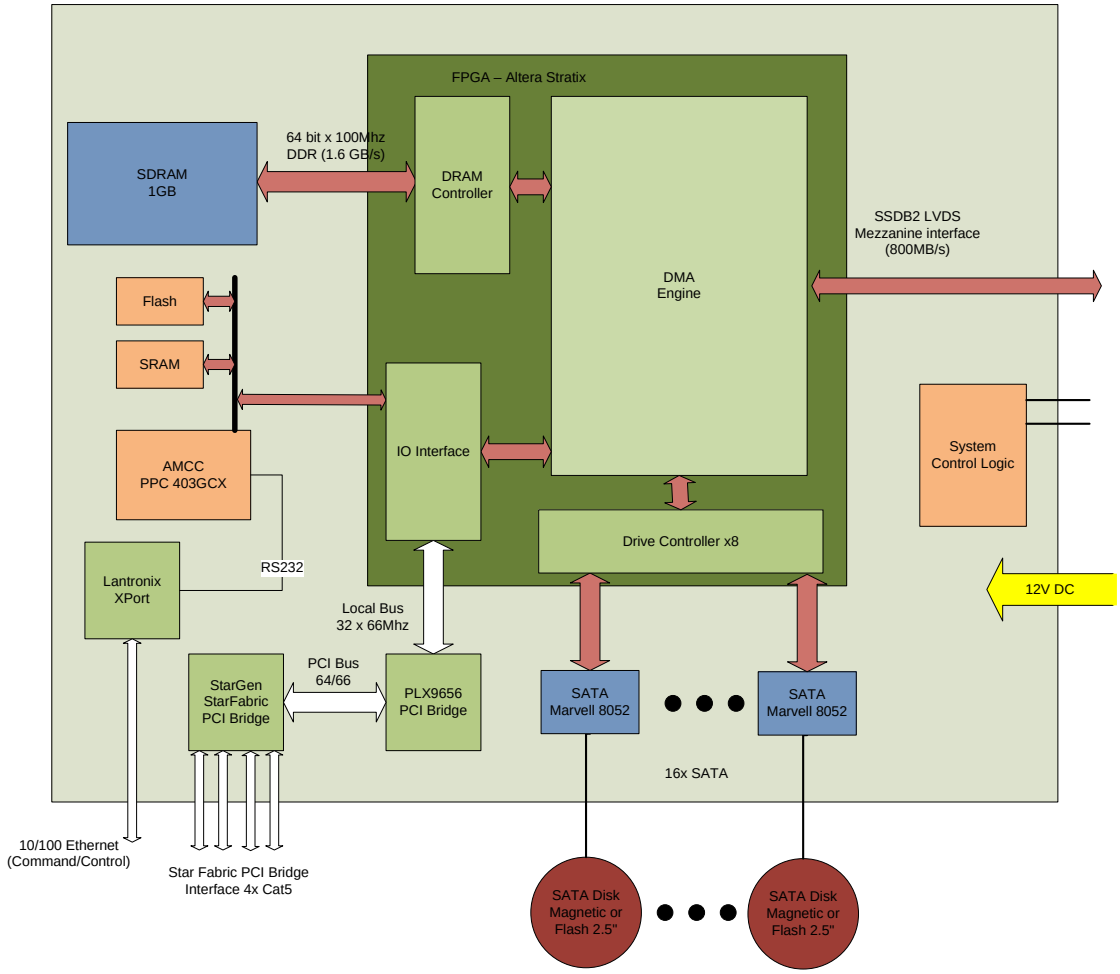


Figure 1 - LTX2 Block Diagram

Specifications

Weight	12 lbs + Drive weight Typically 0.25 lbs per drive
Size	H 1.7" (43mm) x W 15.5" (394) x D 15.25" (387mm)
Power	10A @12 VDC ±10%
Environmental Note that environmental specifications will vary with disk drive selection.	Operating: Temperature: 5C to 50C operating Shock (half sine wave): 300G/2 ms, 160G/1 ms Non-Operating: Temperature: -40C to 65C Shock (half sine wave): 1000G/1 ms Altitude: < 10,000 feet (with magnetic disk)
Capacity	Varies with disk model, up to 16 internal 2.5" SATA disk drives (magnetic or solid-state)
Interfaces	Star Fabric, 10/100 Ethernet Various data interfaces including FPDP, FPDP2, Serial FPDP (optical), LVDS, Camera Link

Components

The LTX2 real-time storage system generally consists of the following components:

- LTX2 System Chassis
- Star Fabric interface board (optional)
- External AC/DC Power supply (optional)
- Star Fabric CAT5 Interface cables, Qty 4 (optional)
- StreamStor Software Development Kit
- User Manual(s)

☠ CAUTION: *Please read the entire installation section before starting to install the LTX2 hardware. This manual assumes that the user is knowledgeable and comfortable with basic computer work, including installation and safety considerations. If you are unsure as to how to proceed, please contact Conduant support.*

Unpacking / Handling

Carefully inspect all shipping packages for any sign of damage. In particular, look for wrinkled or bent corners, holes, or other signs of bad handling or abuse. If you notice any damage to the packaging, immediately open the boxes and inspect the contents for damage. Pay close attention to the components near the area where the packing material was damaged. Report any damage to the carrier and Conduant immediately.

Disk Drives

Hard disk drives such as those that have been included within your system are susceptible to damage from excess shock and careless handling. Please observe the following handling precautions:

* Allow the disk drives to reach room temperature BEFORE applying power to the system. This may take several hours depending on shipping conditions. Disk drive damage can occur if the system is powered while the drives are at temperature extremes.

* Do not drop, jar or bump the system. Even setting the chassis on a hard surface too roughly can damage the recording surfaces, heads, or other mechanical components inside the disk drives.

Star Fabric Board (optional)

The LTX2 system is shipped with an optional Star Fabric board in a specially designed box or bag to prevent electrostatic damage to the board. There should be separate installation instructions included with that board. To avoid damage in handling the board, take the following precautions:

* Ground yourself with a grounding strap or grasp a conductive, grounded object to dissipate any static charge while handling the board.

* Always store the board in its antistatic package when not installed in a computer system.

* Inspect the board carefully before installing in the computer. Do not install a damaged board into your computer.

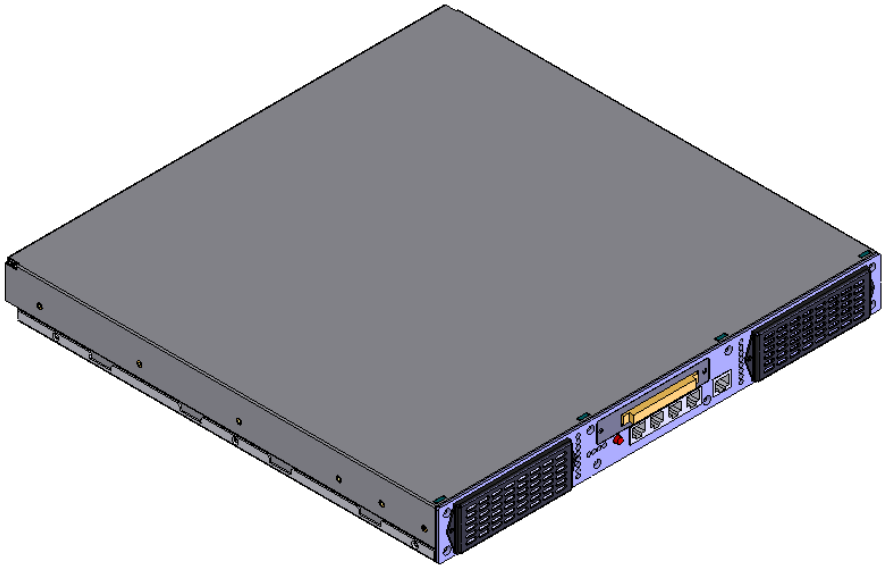
* Never touch any exposed connector pins or component leads.

* Avoid bending or twisting the board.

Planning Your Installation

The LTX2 is designed to allow rack mounting or table top operation. There are optional mounting brackets available to adapt the unit to a standard EIA equipment rack. Please contact your Conduant sales representative for more information.

All electrical connections are designed to come off the front or rear panels. The rear panel utilizes a Molex #`39-01-2061` 6 pin power connector for 12V and ground connections. The mating connector is Molex #`39-01-2060`. A customer drawing is available with detailed dimensions, mounting holes and wiring schematic. Please contact your Conduant sales representative for more information. There is an optional AC power supply available from Conduant (part #020030204).

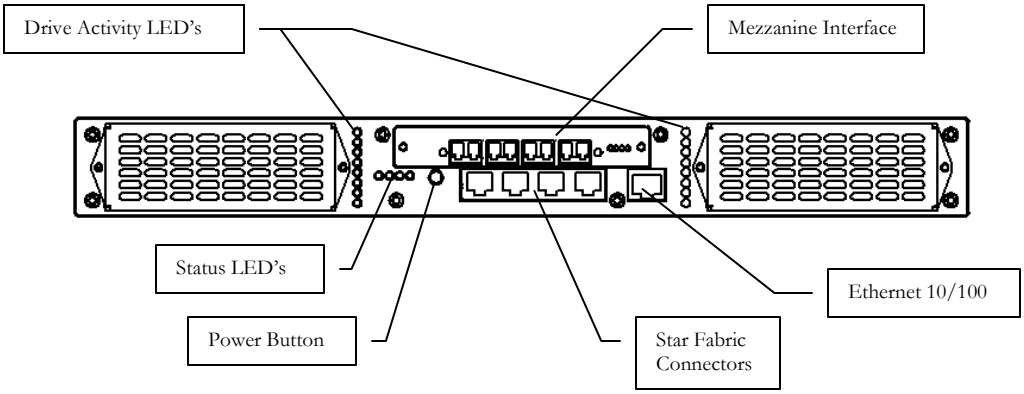


The front panel connections include 4 RJ45 connectors for the Star Fabric interface and an additional RJ45 connector for the Ethernet interface. The data interface connector will vary depending on the installed interface mezzanine board.

☞ **NOTE:** ***The LTX2 is not designed to have other systems stacked on top. Doing so may cause damage to the internal components. Please support these components separately.***

Basic Operation

When the LTX2 is connected to a 12V power supply (an optional AC supply is available), the yellow standby LED will be illuminated. Pressing and holding the power switch for 3 seconds will toggle the power on or off. During device initialization (performed via an `XLROpen` command when connected via Star Fabric and an `XLRNetOpen` command when using the remote interface), the power LED may briefly extinguish until the disk drives are powered on. Upon completion of device initialization, the power and ready LEDs should be



illuminated although it may take an additional 30 seconds before the system will respond to commands.

The LTX2 can be connected to a host system with Ethernet or a Star Fabric PCI bridge connection. When using the Star Fabric interface, the LTX2 will operate identically to having a StreamStor Amazon board installed in the system. Either interface can be used to provide command/control to the system but data access can only be performed using the Star Fabric interface.

Star Fabric

The Star Fabric interface on the LTX2 is used to create a PCI expansion connection back to a host PC. It creates a bridged PCI segment that is recognized by nearly all operating systems without any additional software or special drivers. Once connected successfully, the Big River LTX2 appears as an ordinary StreamStor device on the host PC as if it was a card plugged directly into the computer PCI bus. A Star Fabric interface card must be installed in the host PC and is usually a 64-bit add-in PCI card.

Star Fabric can operate in either 32/33 (32 bits 33 MHz) or 64/66 (64 bits 66 MHz) PCI modes. The main difference is that in 32/33 mode, maximum PCI bus speeds are around 100 MB/s whereas 64/66 mode can achieve 200 MB/s. For 32/33 operation, the Star Fabric host board can be in nearly any available PCI slot and at least Link 1 (2 cables, TX and RX) must be connected. For maximum performance the interface card should be in a 64/66 PCI (or faster) slot and both Link 1 and Link 2 (4 cables) are connected.

The TX and RX ports that are labeled as "Link 1" on the LTX2 are equivalent to "L0" or "Link 0" on the Star Fabric host card. And the TX and RX ports that are labeled as "Link 2" on the LTX2 are equivalent to "L1" or "Link 1" on the Star Fabric host card.

Connections

☠ **CAUTION:** ***Over-flexing the circuit board will damage the host adapter.***

1. Ensure that both the host PC and the LTX2 are powered off.

2. Locate the dip switches or configuration jumpers on the Star Fabric host card. Ensure that the card is configured as a "root" device and that it is configured to operate in "bridge" mode.

3. Carefully insert the host card into the PC.

4. Following the diagram on the upper portion of the host card bracket, connect the first RX port of the host board into the TX port of the LTX2's Link 1 connectors. Next connect the first TX port (i.e. 0) of the host board into the RX port of the LTX2's Link 1 connectors. Complete the same sequence for the second set of ports if 64/66 PCI operation is desired.

5. Power on the LTX2 and make sure that both the standby and power LEDs are illuminated green.

6. Power on the host PC. Green LEDs should be illuminated on the LTX2's Star Fabric connectors and on the Star Fabric host board itself. Solidly illuminated LEDs indicate the connection is ok. Blinking LEDs indicate either the cable connections are incorrect or that the LTX2 was not powered before the host PC.

☞ **NOTE:** ***The LTX2 must be powered on BEFORE the host PC. Otherwise the host PC will NOT recognize the LTX2/StreamStor.***

Operation

Upon completion of the host PC's boot, install the SDK if it is not already installed. Windows users may be required to install a driver via the driver wizard. If so, point the driver wizard to the SDK CD and follow the prompts. Upon completion of the installation routine, run the StreamStor Config-Test utility.

Network Connectivity

The Big River LTX2 is equipped with a 10/100 Ethernet port which allows command and control of the LTX2 over a standard TCP/IP network. Note that this port is not intended or designed for data movement to/from the unit. The

LTX2 can be assigned a static IP address or can be configured via DHCP. This interface is not required if a Star Fabric interface is available.

Configuration

The LTX2 is configured at the factory with a static IP configuration of:

- IP address: 10.1.249.101
- Port: 10001
- Netmask: 255.255.255.0
- Gateway: 10.1.249.254

The serial port settings must be:

- Baud rate: 19200
- Data bits: 8
- Parity: N (none)
- Stop bits: 2

There are 2 alternatives for configuring the LTX2 Ethernet port. For Windows operating systems it is suggested that you use the Lantronix installation/configuration tool. For other operating systems you must use telnet as described below to configure the network settings. The installation CD includes a sub-directory named LTX2 which contains the Lantronix Windows configuration tool and a user manual for this tool. To install this tools simply execute the program DI_Web.exe. This will install the tool onto your system and allow configuration of the LTX2 network interface. See the Lantronix manual "Xport_userguide.pdf" for further instructions on using this tool to configure the LTX2.

For either installation method the LTX2 must be connected to the network with a standard Cat5 cable. A direct connection to a host with a loopback cable is also possible for configuration purposes. Note that the LTX2 must be on the same network segment (no router) to perform this configuration.

Perform the following steps to modify the LTX2's default IP address and configuration using a telnet connection:

1. Connect the LTX2's Ethernet port (via CAT5e) to a standard 10/100 Ethernet hub, switch, or to a host PC via a loopback cable. Note that this configuration must be performed with the two devices on the same network segment.

2. Open a command prompt (Start->Run "cmd") and type "telnet 10.1.249.101 9999". 9999 is the special LTX2 port number for telnet configuration. This is NOT the port described above.

3. Press Enter when prompted and the main menu will appear.

4. Press 0 to enter "Server Configuration" and follow the prompts to enter a new static IP address. If DHCP configuration is desired enter 0s for the IP address and follow the prompts.

5. When finished press 9 to save and exit.

The following screen shot shows the IP address configuration being changed from the default static IP assignment to a DHCP configuration:

Telnet 10.1.249.92
0 Server configuration
1 Channel 1 configuration
3 E-mail settings
5 Expert settings
6 Security
7 Factory defaults
8 Exit without save
9 Save and exit Your choice ? 0
IP Address : (010) 0.(001) 0.(249) 0.(092) 0
Set Gateway IP Address (N) N
Netmask: Number of Bits for Host Part (0=default) (0) 0
Change telnet config password (N) N
Change DHCP device name (not set) ? (N) N
Change Setup:
0 Server configuration
1 Channel 1 configuration
3 E-mail settings
5 Expert settings
6 Security
7 Factory defaults
8 Exit without save
9 Save and exit Your choice ?

The following screen shot shows the static IP address being changed from the default to 10.1.249.90:

Telnet 10.1.249.92
Change Setup:
0 Server configuration
1 Channel 1 configuration
3 E-mail settings
5 Expert settings
6 Security
7 Factory defaults
8 Exit without save
9 Save and exit Your choice ? 0
IP Address : (010) 10.(001) 1.(249) 249.(092) 90
Set Gateway IP Address (N) N
Netmask: Number of Bits for Host Part (0=default) (0) 0
Change telnet config password (N) N
Change Setup:
0 Server configuration
1 Channel 1 configuration
3 E-mail settings
5 Expert settings
6 Security
7 Factory defaults
8 Exit without save
9 Save and exit Your choice ?

Perform the following steps to change the default IP port number:

1. Connect the LTX2's Ethernet port (via CAT5e) to a standard 10/100 Ethernet hub, switch, or to a host PC via a loopback cable.

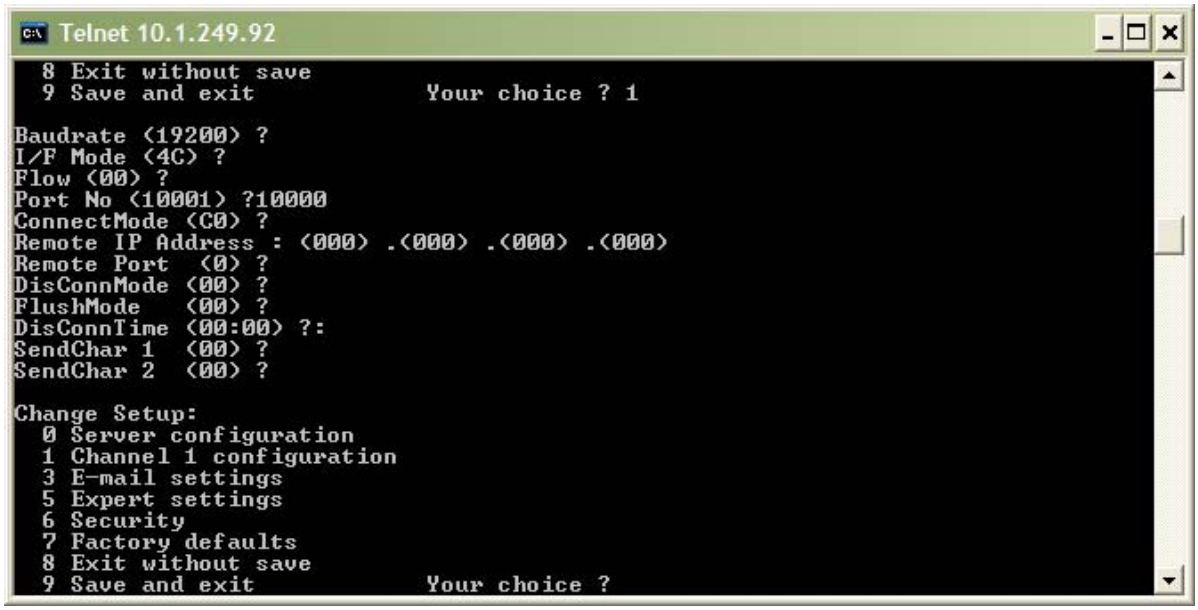
2. Open a command prompt (Start->Run "cmd") and type "telnet x.x.x.x 9999" where x.x.x.x is the default IP address (listed above). 9999 is the special LTX2 port number for telnet configuration. This is NOT the port described above.

3. Press Enter when prompted and the main menu will appear.

4. Press 1 to enter "Channel 1 configuration." At each prompt press enter to leave it blank except for the "Port No" prompt. Enter a new port number at this prompt and press enter. The following screen shot shows the port number being changed from the default 10001 to 10000.

5. When finished press 9 to save and exit.

The following screen shot shows the TCP/IP port number being changed from the default to 10000:



Installing the Software

Your system was shipped with the Software Development Kit on CD-ROM. Install the software prior to installing the hardware if possible. On Windows systems, when ready, run the `setup.exe` program on the CD-ROM to start the installation process.

Plug and play operating systems such as Windows will detect the installation of the StreamStor board if the LTX2 is connected via Star Fabric and attempt to configure the system using the hardware plug and play wizard program. The required installation information file for plug and play installation is included on the CD-ROM. Make sure the plug and play wizard includes the CD-ROM drive in its search so that the StreamStor drivers will be properly installed. You should not cancel the plug and play wizard since this can create hardware conflicts in the system when using the StreamStor controller. Note that the. `setup.exe` program must still be executed to install the StreamStor SDK onto your system.

The software installation procedure will install the device drivers, library files, example programs and all other components of the SDK onto your system.

The StreamStor SDK does not include software interfaces or drivers used for the control of data acquisition cards made by other manufacturers. However, it does include some sample programs to help in your software development efforts. Other drivers and examples may be available depending on your choice of data acquisition hardware. Contact Conduant support for more information.

Always review the **`readme.html`** file included with the SDK for the latest information not included in this manual. Also, check the Conduant web site periodically for additional information.

Software Functionality

The LTX2 StreamStor controller supports recording and playback (or read) from the PCI bus or a daughter board interface.

The following API commands are supported by the LTX2 controller: Note: Only those functions marked with an asterisk (*) are available when using the Ethernet interface.

- XLRApiVersion*
- XLRAppend*
- XLRBindInputChannel*
- XLRBindOutputChannel*
- XLRCardReset*
- XLRClearChannels*
- XLRClearOption*
- XLRClearWriteProtect*
- XLRClose*
- XLRDeleteAppend*
- XLRDeviceFind*
- XLREdit
- XLREditData
- XLRErase*
- XLRGetBaseAddr
- XLRGetBaseRange
- XLRGetDBInfo*
- XLRGetDeviceInfo*
- XLRGetDeviceStatus*
- XLRGetDirectory*
- XLRGetDriveInfo*
- XLRGetDriveTemp
- XLRGetErrorMessage*
- XLRGetLabel*
- XLRGetLastError*
- XLRGetLength*
- XLRGetLengthPages*
- XLRGetLengthLowHigh*
- XLRGetMode*
- XLRGetOption*
- XLRGetPartitionInfo
- XLRGetPlayBufferStatus
- XLRGetPlayLength*
- XLRGetSample
- XLRGetSystemAddr
- XLRGetUserDir*

- XLRGetUserDirLength*
- XLRGetVersion*
- XLRGetWindowAddr
- XLRNetOpen (Ethernet only)
- XLROpen
- XLRPartitionCreate
- XLRPartitionSelect
- XLRPlayback*
- XLRPlaybackLoop
- XLRPlayTrigger*
- XLRRead, XLRReadData
- XLRReadImmed
- XLRReadSmartThresholds
- XLRReadSmartValues
- XLRReadStatus*
- XLRRecord
- XLRRecoverData
- XLRReset
- XLRSelectChannel*
- XLRSelfTest
- XLRSetDBMode*
- XLRSetLabel
- XLRSetMode*
- XLRSetOption
- XLRSetPlaybackLength
- XLRSetPortClock (not available for Serial FPDP daughter boards)
- XLRSetReadLimit
- XLRSetSampleMode
- XLRSetUserDir
- XLRSetWriteProtect
- XLRStop*
- XLRTruncate
- XLRWrite, XLRWriteData

The LTX2 system does not currently support event capture or bank switching. See the StreamStor SDK user manual for more information.

SDK and Network Operation

Most API commands will work in an identical fashion in either Network or PCI (i.e. Star Fabric) modes. The main exception is the open command. XLROpen is used when the LTX2 is connected to the host over Star Fabric. XLRNetOpen is required when the LTX2 is connected to the host PC over Ethernet/TCP/IP. More details on each command can be found in the function reference section of the StreamStor SDK Users Manual.

Daughter Boards

The LTX2 StreamStor controller includes the capability to add a daughter board (mezzanine) with its own connectors and electronics to provide an alternate method of transferring data into and out of StreamStor. These additional paths offer several advantages, including:

- freedom from interaction with other devices on an arbitrated bus such as PCI;
- the reduction or elimination of bus FIFOs that may otherwise be required to interface with an arbitrated bus;
- full isolation of the data path from operating system and computer hardware facilitates predictable and repeatable behavior;
- better or additional control over timing and other parameters;
- higher bus utilization efficiency due to a non-arbitrated nature;
- access to interface signals without risk of crashing host computer;
- higher data rates than the most common PCI buses support; and
- potential for dual-port operation (simultaneous transfers on both PCI bus and external ports) while recording or playing back.

If an optional daughter board is ordered with your LTX2 board it will come completely installed and ready to use. The `XLRSetDBMode` function in the API is used to program the behavior of the daughter boards and the modes and options are unique to the specific type of daughter board installed. Please refer to the programming manual provided for your specific daughter board. These documents use the naming convention "DB_xxxxx.pdf" where "xxxxx" is the interface type implemented by the daughter board (e.g. DB_FPDP2.pdf) and are also available on the CD delivered with your system.

Technical Support

Conduant wants to be sure that your LTX2 StreamStor system works correctly and stays working correctly. In the event, however, that you are unable to get your new system to work properly, or if a working system ceases to function, we will do all that we can to get your system back online.

Solving the problem is largely a matter of data collection and steps that must be taken one at a time. In order for us to better serve you, we ask that you take the time to perform the following steps prior to calling us. This way, you can provide us with the most meaningful information possible that will help us solve the problem.

Is the problem one that obviously requires replacement parts due to physical damage to the system? If yes, then please gather the information described below and report the problem to tech support, by phone or through the Conduant web site.

Have you confirmed that no cabling has been inadvertently disconnected or damaged while working around the equipment?

Do all the systems have good power connections and voltages?

Does the confidence test sscfg.exe run OK?

Has the software installation been corrupted? Try re-installing software.

Have you checked the Conduant web site for technical bulletins?

Have you recently installed a new compiler or a new Windows Service Pack?

If the above steps did not resolve the problem, then please initiate a trouble ticket on the support section of the Conduant website at www.conduant.com. Please provide as much information about your system and the problem as possible. We will do all that we can to resolve the problem as quickly as possible.

Contacting Technical Support

E-mail: support@conduant.com

Web: www.conduant.com

Mail: Conduant Corporation
Technical Support
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